

Amendment and Response Under 37 C.F.R. §1.116 - Expedited Examining Procedure
Serial No.: 10/019,521
Confirmation No.: 2112
Filed: June 6, 2002
For: MICRO-ELECTROMECHANICAL DEVICES AND METHODS OF MANUFACTURE

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Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

1. **(Currently amended)** A method of manufacturing a micro-electromechanical device having front and back sides, the method comprising:

providing a substrate comprising a first side located proximate the front side of the device and second side proximate the back side of the device;

providing sacrificial material on a selected area of the first side of the substrate, wherein the sacrificial material is reflowable;

providing a diaphragm layer on the sacrificial material and the first side of the substrate surrounding the sacrificial material in the selected area;

providing at least one transducer on the front side of the device, the transducer located over the sacrificial material, wherein the transducer comprises transducing material and electrical contacts in electrical communication with the transducing material;

forming a void in the substrate from the second side of the substrate towards the first side of the substrate after providing the transducer on the front side of the device, wherein at least a portion of the sacrificial material is exposed within the void proximate the first side of the substrate; and

removing at least a portion of the sacrificial material through the void, wherein a portion of the diaphragm layer is suspended directly above the substrate within the selected area;

wherein the method further comprises reflowing the sacrificial material.

2. **(Original)** A method according to claim 1, wherein the suspended portion of the diaphragm layer and the substrate form an included angle at their junction of less than 90 degrees.

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3. **(Previously presented)** A method according to claim 1, wherein the void is formed by etching through the substrate while the electrical contacts are exposed on the front side of the device.
4. **(Previously presented)** A method according to claim 1, wherein the electrical contacts are metallic, and wherein the void is formed by etching through the substrate while the metallic electrical contacts are exposed on the front side of the device.
5. **(Previously presented)** A method according to claim 1, wherein removing the sacrificial material comprises selectively etching the sacrificial material.
6. **(Original)** A method according to claim 5, wherein removing the sacrificial material comprises selectively etching the sacrificial material by exposing only the back side of the device to an etchant.
7. **(Original)** A method according to claim 6, wherein the etchant is in a gas phase.
8. **(Previously presented)** A method according to claim 1, wherein providing the sacrificial material comprises depositing a layer of the sacrificial material on the first side of the substrate in the selected area.
9. **(Original)** A method according to claim 8, wherein the first side of the substrate is planar.
10. **(Cancelled)**

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11. **(Previously presented)** A method according to claim 1, wherein the void comprises an opening within the selected area on the first side of the substrate that is smaller than the selected area occupied by the sacrificial material.
12. **(Previously presented)** A method according to claim 1, wherein forming the void in the substrate further comprises forming a proof mass attached to the diaphragm layer, the proof mass comprising a portion of the substrate that is separated therefrom.
13. **(Original)** A method according to claim 12, wherein the void is in the shape of an annular ring and the proof mass is cylindrical.
14. **(Previously presented)** A method according to claim 12, wherein the suspended portion of the diaphragm layer and the proof mass form an included angle at their junction of less than 90 degrees.
15. **(Currently amended)** A substrate assembly having front and back sides, the assembly comprising:
a substrate comprising a first side located proximate the front side of the device and second side proximate the back side of the substrate assembly;
sacrificial material on the first side of the substrate in a plurality of selected areas, wherein the sacrificial material comprises reflowed sacrificial material;
a diaphragm layer covering the sacrificial material in the selected areas, the diaphragm layer extending to cover the first side of the substrate surrounding the sacrificial material in the selected areas;
a plurality of transducers on the front side of the device, each of the transducers located over at least a portion of each of the selected areas, wherein the transducer comprises transducing material and electrical contacts in electrical communication with the transducing material;

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wherein the sacrificial material in the selected areas is encapsulated between the substrate and the diaphragm layer.

16. (Original) An assembly according to claim 15, wherein the diaphragm layer and the substrate form an included angle at edges of the sacrificial material in the selected areas of less than 90 degrees.

17. (Previously presented) An assembly according to claim 15, wherein the electrical contacts are metallic.

18. (Previously presented) An assembly according to claim 15, wherein the sacrificial material is selectively removable with respect to the diaphragm layer and the substrate.

19. (Previously presented) An assembly according to claim 15, wherein the sacrificial material comprises a layer deposited on the first side of the substrate in the selected areas.

20. (Previously presented) An assembly according to claim 15, wherein the first side of the substrate is planar.

21. (Cancelled)

22. (Currently amended) An assembly according to claim 24 15, wherein the sacrificial material comprises glass.

23-37. (Cancelled)